CHAPTER IV

RESULTS

This survey research is aimed to study behavior of health care workers in infectious waste management at national referral hospital Thimphu, Bhutan. Self-administered questionnaires were distributed to 85 technicians, 120 nurses and 36 doctors and the questionnaire return rate was 94.12%, 93.33% and 100% respectively. 2 trained interviewers carried out interview of 55 auxiliary staff for two days. The study was carried out from 5th- 10th May 2004. The results are summarized below.

4.1 Socio-demographic data

4.2 Descriptive data on knowledge, attitude and behavior of auxiliary, technicians, nurses and doctors in infectious waste management.

4.3 Relationship between knowledge, attitude and socio-demographic factors, and behavior of health workers in infectious waste management.

4.4 Comparison of behavior of health professional and auxiliary staff in infectious waste management.

4.5 Elaborate on information for policy, deployment of policy and recommendations of health workers.

4.1 Socio-Demographic Data

Table 4.1: **Distribution of frequencies and percentages of health care workers by socio-demographic data. (n=283)**

	Personal data	Number	Percentage
Age	20-30 years	128	45.2
	31-40 years	123	43.5
	41-50 years	26	9.2
	≥51 years	6	2.1
Mean=32.45	SD=7.34	Min=20	Max=62
Gender	Male	137	48.4
	Female	146	51.6
Male : Female	1:1.06		
Level of education	≤Secondary	108	38.2
	Diploma	120	42.4
	Bachelor	32	11.3
	Masters	23	8.1
Job category	Auxiliary	55	19.4
	Technicians	80	28.3
	Nurse	112	39.6
	Doctors	36	12.7
Infectious waste management training	Never	229	80.9
	Once	45	15.9
	>Once	9	3.2
Duration in service years	<1	15	5.3
	1-5.9	87	30.7
	6-10.9	85	30.0
	>11	96	33.9
Mean=8.95	Max=36	Min=0.17	SD=6.55

The total number of respondents was 283 which included 55 auxiliary staff, 80 technicians, 112 nurses and 36 doctors. Most of the respondents (88.7%) were between 20-40 years and the mean age is 32.45. The male to female ratio was almost equal (1:1.06). The level of education of respondents was diploma (42.4%), secondary and below (38.2%), bachelor degree (11.3%) and master degree (8.1%). Infectious waste management training never had were 80.9%, once was 15.9% and more than once were 3.2% of all the respondents. On the duration in service 96 subjects were above 11 years, while 85 were between 6-10.9 years and 87 were 1-5.9 years and 15 subjects were <1 year with mean of 8.95 years.

4.2 Descriptive data on knowledge, attitude and behavior of auxiliary, technicians, nurses and doctors in infectious waste management.

4.2.1 Knowledge of health workers in infectious waste management.

Table 4.2:   Number and percentage of correct and incorrect answers on knowledge in infectious waste management.

Sl. No.	Questions	Correct	Incorrect
1	Which of the following waste is not infectious?	280 (98.9%)	3 (1.1%)
2	Hospital waste is different from household waste	282 (99.6%)	1 (0.4%)
3	Before transport of infectious waste which of the following needs to be done?	199 (70.3%)	**84 (29.7%)**
4	Correct way of carrying infectious waste bags is	283 (100%)	-
5	Cart for carrying infectious waste is	282 (99.6%)	1 (0.4%)

Table 4.2: **(Cont.) Number and percentage of correct and incorrect answers on knowledge in infectious waste management.**

Sl. No.	Questions	Correct	Incorrect	
6	What would you do if there is spill of infectious waste?	195	**88**	
		(68.9%)	**(31.1%)**	
7	Following personal protective equipment are required for handling infectious waste except	282	1	
		(99.6%)	(0.4%)	
8	Infectious waste bags can be stored	277	6	
		(97.9%)	(2.1%)	
9	Infectious wastes are made non-infectious by all except	281	2	
		(99.3%)	(0.7%)	
10	People at risk from infectious waste are	282	1	
		(99.6%)	(0.4%)	

There were 10 questions on knowledge in infectious waste management. Most of the questions were answered correctly by majority of respondents except for question (q3) on closing of infectious waste bag (70.3% correct only) and (q6) action to be taken in case of spill of waste (68.9% correct only).

Table 4.3: **Detail of response on knowledge in infectious waste management.**
(n=283)

Statement	Answer	Frequency	Percentage
1. Which of the following waste is not infectious?	Blood and blood products	-	-
	Used needles and syringes	1	0.4
	Items in contact with patients	2	0.7
	*Left over foods, fruit peels, vegetables and papers.	280	98.9
2. Hospital waste different from household waste because	Waste is massive in amount	-	-
	*Waste contain infectious and hazardous materials	282	99.6
	Waste contain various types of materials	1	0.4
	Wastes decay easily	-	-
3. Before transport of infectious waste, what to be done	*Bag closed ¾th full	199	70.3
	Bag closed when full	**2**	**0.7%**
	Bag closed when ½ full	**82**	**29.0**
	Bag closed after pushing in as much waste as possible	-	-
4. Correct way of carrying infectious waste bags	*Lift bag at top and carry without dragging	283	100
	Catch the bag at top and drag	-	-
	Lift and hold bag between arms and chest	-	-
	Lift and carry it on top of the head	-	-
5. Cart for carrying infectious waste is	*Washed everyday after work	282	99.6
	Washed once a week	-	-
	Washed when dirty	-	-
	Not washed	1	0.4

Table 4.3: (Cont.) Detail of response on knowledge in infectious waste management. (n=283)

Statement	Answer	Frequency	Percentage
6. After spill of infectious waste, what would you do?	Leave it there for someone to do the cleaning	-	-
	Pickup the waste and continue your work	1	0.4
	*Pickup the waste, pour disinfectant and clean after ½ an hour with water	195	68.9
	Pickup the waste and clean the area immediately with water	**87**	**30.7**
7. The following PPE are required except	Thick rubber gloves	-	-
	Plastic apron	-	-
	Gum boots	1	0.4
	*Thick white shirt	282	99.6
8. After removal from wards, infectious waste bags can be stored	Where ever there is space within the hospital	-	-
	Near the wards safe from dogs	1	0.4
	*Designated safe area inside the health facility	278	98.2
	Outside the hospital boundary wall	4	1.4
9, Infectious wastes made non-infectious by any of these methods except	Incineration	1	0.4
	Chemical disinfections	-	-
	Autoclaving	1	0.4
	*Fermentation	281	99.2
10. People at risk of infection from infectious waste are	Doctors, Dentists and Nurses	1	0.4
	Technicians, ward boys and sweepers	-	-
	*All of above	282	99.6
	None of above	-	-

* Correct answer

The questions in knowledge in infectious waste were answered correctly by majority of the subjects except the questions 3 and 6. Regarding tying of the infectious waste bag 84 subjects (29.7%) answered incorrectly and action to be taken after spill of infectious waste was incorrectly answered by 88 subjects (31.1%).

Table 4.4:   Health workers classified by level of knowledge in infectious waste management. (n=283)

Level of knowledge	Number (persons)	Percent
Low (0-8 scores)	73	25.8
High (9-10 scores)	210	74.2
Total	283	100.0

Mean=7.4,   SD=4.38,   Max=10,   Min=4

In table 4.4, the health workers were classified into high and low knowledge by using 80% as the cut off point. When classified by set criteria, it is evident that most of the subjects (74.2%) have high level of knowledge and the remainder (25.8%) has low level knowledge in infectious waste management. The average score is 7.4, the highest and lowest score is 10 and 4 respectively. The standard deviation equaled 4.38

Table 4.5: Number and percent of total scores obtained on knowledge in infectious waste, by health worker category (n=283).

Correct items	Auxiliary (n=55)	Technicians (n=80)	Nurses (n=112)	Doctors (n=36)
1				
2				
3				
4		1 (1.3%)		
5				
6				
7		1 (1.3%)		
8	41 (74.5%)	19 (23.8%)	10 (8.9%)	1 (2.8%)
9	5 (9.1%)	16 (20.0%)	14 (12.5%)	
10	9 (16.4%)	43 (53.8%)	88 (78.6%)	35 (97.2%)
Mean	8.42	9.21	9.69	9.94

Table 4.5 shows that high score for auxiliary, technicians, nurses and doctors were 14 (25.5%), 59 (73.7%), 102 (91.1%) and 35 (97.2%) respectively. 41 (74.5%) auxiliary staff scored 8 with a mean of 8.42. Among the technicians 43 (53.8%) scored 10 with a mean of 9.21 while 88 (78.6%) nurses scored 10 with a mean of 9.69 and 35 (97.2%) doctors scored 10.

Table 4.6: Percentage of knowledge level within job category of health workers.

	Auxiliary	Technicians	Nurses	Doctors	p-value
Low knowledge	41 (74.5%)	21 (26.3%)	10 (8.9%)	1 (2.8%)	<.001
High knowledge	14 (25.5%)	59 (73.8%)	102 (91.1%)	35 (97.2%)	
Total	55	80	112	36	283

Chi-square test performed showed that low knowledge among job categories were 74.5%, 26.3%, 8.9% and 2.8% for auxiliary, technicians, nurses and doctors respectively. 25.5%, 73.8%, 91.1% and 97.2% of the auxiliary, technicians, nurses and doctors were placed in high knowledge groups respectively. There was statistically significant difference in knowledge level among the job categories, the more educated ones being better.

4.2.2 Attitude of health care workers in infectious waste management.

The attitude questions 4, 1 and 7 were ranked as top three and questions 6, 8 and 9 were ranked as next three. The 4 negative questions 3, 2, 10 and 5 were ranked as last four.

Table 4.7: **Distribution of frequencies and percentage, and rank by mean of attitude toward infectious waste management by items (n=283).**

Items	n	Strongly Agree 5	Agree 4	Neutral 3	Disagree 2	Strongly Disagree 1	Mean	Rank
4. It is necessary to wear gloves before handling infectious waste	283	272 (96.1%)	10 (3.5%)	-	-	1 (0.4%)	4.95	1
1. Health workers have crucial role in management of infectious waste	283	252 (89.0%)	26 (9.2%)	4 (1.4%)	1 (0.4%)	-	4.87	2
7. Closing infectious waste when 3/4th full will make your working environment safer	282	229 (80.9%)	47 (16.6%)	2 (0.7%)	2 (0.7%)	2 (0.7%)	4.77	3

Table 4.7: (Cont.) Distribution of frequencies and percentage, and rank by mean of attitude toward infectious waste management by items (n=283).

Items	n	Strongly Agree 5	Agree 4	Neutral 3	Disagree 2	Strongly Disagree 1	Mean	Rank
6. The cart for carrying infectious waste should be cleaned daily after work	283	227 (80.2%)	47 (16.6%)	3 (1.1%)	2 (0.7%)	4 (1.4%)	4.73	4
8. Infectious waste should be transported through shortest and safest route	280	222 (78.4%)	47 (16.6%)	7 (2.5%)	-	2 (0.7%)	4.72	5
9. Route for infectious waste transport should be well known among hospital staff	281	214 (75.6%)	56 (19.8%)	7 (2.5%)	2 (0.7%)	2 (0.7%)	4.70	6
3.*Needles should be recapped before throwing	280	161 (56.9%)	31 (11.0%)	6 (2.1%)	18 (6.4%)	64 (22.6%)	3.74	7
2.*Waste segregation makes your work difficult	271	54 (19.1%)	49 (17,3%)	22 (7.8%)	63 (22.3%)	83 (29.3%)	2.73	8
10.*Infectious waste can be stored where ever there is space in the hospital	283	28 (9.9%)	4 (1.4%)	11 (3.9%)	77 (27.2%)	163 (57.6%)	1.79	9
5.*Cart used for carrying infectious waste can be used for carrying other things too	280	19 (6.7%)	8 (2.8%)	6 (2.1%)	58 (20.5%)	189 (66.8%)	1.61	10

*Negative question: need reversal before interpretation.

Table 4.8 : Comparative attitude mean with ranking among 4 categories of health workers in each of the 10 statements. (ranking by doctors)

Statement	Auxiliary (n=55)	Technicians (n=80)	Nurses (n=112)	Doctors (n=36)	Rank
4. It is necessary to wear gloves before handling infectious waste	4.93 (1)	4.96 (1)	4.95 (1)	4.97	1
1. Health workers have crucial role in management of infectious waste	4.93 (1)	4.81 (2)	4.86 (2)	4.94	2
7. Closing infectious waste bags when 3/4th full will make your working environment safer	4.91 (2)	4.61 (6)	4.79 (3)	4.83	3
8. Infectious waste should be transported through shortest and safest route	4.91 (2)	4.62 (5)	4.68 (6)	4.81	4
5. Cart used for carrying infectious waste can*(not) be used to carry other things too	3.95 (4)	4.52 (7)	4.41 (8)	4.75	5
10. Infectious waste can*(not) be stored where ever there is space	3.38 (5)	4.30 (8)	4.42 (7)	4.64	6
9. Route for infectious waste transport should be well known	4.84 (3)	4.67 (4)	4.69 (5)	4.58	7
6. Cart used for carrying infectious waste should be washed daily	4.84 (3)	4.71 (3)	4.78 (4)	4.5	8
2. Waste segregation*(does not) make your work difficult	3.29 (6)	2.86 (9)	3.34 (9)	3.86	9
3. Needles should*(not) be recapped before throwing	1.84 (7)	1.87 (10)	2.5 (10)	3.03	10
Mean	41.82	41.93	43.42	44.91	

*(not) and *(does not) are the correct statement.

The comparative attitude mean of various categories of health workers are almost equal in all questions except for the 4 negatives questions. On question 2, the attitude mean was least for technician (2.86) and the most was for doctors (3.86) while auxiliary staff and nurses scored in-between them. On questions 3, 5 and 10, attitude mean score for was least for auxiliary and most for doctors while the technicians and nurses scored in-between them. Questions 4 and 1 were ranked as top two and negative questions 2 and 3 were ranked last by professional health workers.

Table 4.9 : **Distribution of frequencies of various categories of health workers classified by level of attitude in infectious waste management.**

Job category	Attitude level		Total
	Negative (≤42.57)	Positive (≥42.58)	
Auxiliary	38 (69.1%)	17 (30.9%)	55
Technician	39 (48.7%)	41 (51.3%)	80
Nurse	47 (42.0%)	65 (58.0%)	112
Doctor	10 (27.7%)	26 (72.2%)	36
Total	134	149	283

The mean attitude score (mean=42.57) of subjects was used to divide the health workers into 2 levels of attitude, positive and negative. The mean was used because the scores were uniformly distributed in a normal curve. The table 4.7 shows that auxiliary staff has more negative attitude (38) and only 17 has positive attitude. 41 technicians has positive attitude and 39 has negative attitude. Of the 112 nurses, 47 has negative attitude and 65 has positive attitude. Among the doctors, 26 has positive attitude and 10 has negative attitude towards infectious waste management. Of all the health workers

149 has positive attitude and 134 has negative attitude towards infectious waste management.

Table 4.10 :   Percentage of attitude level within job categories of health workers.

	Auxiliary	Technicians	Nurses	Doctors	p-value
Negative Attitude	38	39	47	10	.001
	(69.1%)	(48.8%)	(42.0%)	(27.8%)	
Positive Attitude	17	41	65	26	
	(30.9%)	(51.3%)	(58.0%)	(72.2%)	
Total	55	80	112	36	283

Chi-square test performed between the attitude level and within job categories showed that auxiliary (69.1%), technicians (48.8%), nurses (42.0%) and doctors (27.8%) had negative attitude respectively. High attitude were auxiliary (30.9%), technicians (51.3%), nurses (58.0%) and doctors (72.2%) respectively. There was statistically significant difference in attitude level among the job categories, the more educated ones being better than the low educated (p=.001).

4.2.3   Behavior of health workers in infectious waste management

Table 4.11 :   Distribution of frequencies and percentage, and rank by response on behavior of health workers towards infectious waste management by items (n=283).

Statement	N=	Always 5	Often 4	Sometimes 3	Seldom 2	Never 1	Mean	Rank
4. You wash your hands after handling infectious wastes	283	265 (93.6%)	16 (5.7%)	1 (0.4%)	-	1 (0.4%)	4.92	1
8. You check infectious waste bags for tear or puncture before transport	281	251 (89.3%)	20 (7.1%)	4 (1.4%)	5 (1.8%)	1 (0.4%)	4.83	2
1. You wear gloves before handling infectious waste	283	224 (79.2%)	47 (16.6%)	11 (3.9%)	1 (0.4%)	-	4.75	3
5. You close infectious waste bags when 3/4th full	281	227 (80.8%)	33 (11.7%)	11 (3.9%)	2 (0.7%)	8 (2.8%)	4.67	4
9. After spill of infectious waste, you pick it up, disinfect and clean the area	281	209 (74.4%)	41 (14.6%)	25 (8.9%)	3 (1.1%)	3 (1.1%)	4.60	5
7. You walk carefully on the route meant for infectious waste transport	278	197 (70.9%)	42 (15.1%)	22 (7.9%)	10 (3.6%)	7 (2.5%)	4.48	6
10. You report accidental injuries sustained during handling infectious wastes	281	195 (69.4%)	28 (10.0%)	30 (10.7%)	11 (3.9%)	17 (6.0%)	4.33	7
3.*You recap needles after use before throwing	281	171 (60.9%)	24 (8.5%)	13 (4.6%)	11 (3.9%)	62 (22.1%)	3.82	8
2.*In emergency situations, you forget to use protective measures	282	12 (4.3%)	43 (15.2%)	154 (54.6%)	13 (4.6%)	60 (21.3%)	2.77	9
6.*You drag infectious waste bags during transport	277	7 (2.7%)	2 (0.7%)	15 (5.4%)	10 (3.6%)	243 (87.7%)	1.27	10

*Negative statement: need reversal before interpretation

There are 10 questions in behavior in infectious waste management of which questions 2, 3 and 6 were negative. Questions 4, 8 and 1 were ranked as top 3, questions 5, 9 and 7 were ranked as middle 3 while question10 and negative question 3, 2 and 6 were ranked as last four.

Table 4.12 : Comparative behavior mean of various categories of health workers in each of the 10 statements (n=283) and rank by doctors.

Statement	Auxiliary (n=55)	Technicians (n=80)	Nurses (n=112)	Doctors (n=36)	Rank
4. You wash your hands after handling infectious waste	4.95 (3)	4.89 (1)	4.95 (1)	4.89	1
8. You check infectious waste bags for tear or puncture before transport	5.00 (1)	4.86 (2)	4.77 (3)	4.72	2
9. After spill of infectious waste, you pick it up, disinfect and clean the area	4.65 (7)	4.61 (6)	4.55 (5)	4.67	3
5. You close infectious waste bags when 3/4th full	4.91 (4)	4.73 (4)	4.50 (6)	4.67	3
6. You*(do not) drag infectious waste bags during transport	4.79 (5)	4.67 (5)	4.78 (2)	4.64	4
10. You report injuries sustained during handling of infectious waste	4.73 (6)	4.16 (8)	4.14 (8)	4.64	4
1. You wear gloves before handling infectious wastes	4.91 (4)	4.77 (3)	4.70 (4)	4.58	5
7. You walk carefully on the route meant for infectious waste transport	4.96 (2)	4.44 (7)	4.34 (7)	4.31	6
2. In emergency situations, you *(do not) forget to use protective measures	3.78 (8)	3.09 (9)	3.01 (9)	3.42	7
3. You*(do not) recap needles after use	1.80 (9)	1.89 (10)	2.36 (10)	2.81	8
Mean	44.48	42.11	42.10	43.35	

*(do not) is the correct statement.

The behavior mean of various categories of health workers are almost evenly scored except on the two negative questions 2 and 3. For question number 2, the behavior mean was least for nurses with score of 3.01 and most for auxiliary 3.78 followed by doctors 3.42 and technicians 3.09. Question 3, the behavior mean was least for auxiliary 1.80 and most for doctors 2.81 while the technicians and nurses scores were in-between them. Questions 4 and 8 are ranked top two by all job categories while in rest of the questions there are no general agreements among the job categories in ranking.

Table 4.13 : Distribution of frequencies of various categories of health workers classified by level of behavior in infectious waste management.

Job category	Behavior level		Total
	Bad ($\leq$42.38)	Good ($\geq$42.39)	
Auxiliary	19 (34.5%)	36 (65.4%)	55
Technician	40 (50.0%)	40 (50.0%)	80
Nurse	52 (46.4%)	60 (53.6%)	112
Doctor	9 (25.0%)	27 (75.0%)	36
Total	120	163	283

The mean behavior score (mean=42.38) of the subjects was used to divide the health workers into 2 levels of behavior, bad and good as used by Suthat Chottanpund, 2002. Table 4.9 shows that of 55 auxiliary staff 19 had bad and 36 had good behavior. Among the technicians equal number of good behavior (40) and bad behavior (40) subjects were present. 60 nurses had good behavior and 52 of them had bad behavior. Of the doctors 27 had good behavior and only 9 had bad behavior.

Table 4.14 : Difference between the not missing and missing data in attitude and behavior questions in terms of socio-demographic characteristics.

Socio-demographic characteristics	Not missing data (n=250)	Missing data (n=33)	Significance (p-value)	
1. Age	Mean=32.58 SD=7.27	Mean=31.45 SD=7.96	T-test	.407
2. Gender				
Male	124 (49.6%)	13 (39.4%)	Pearson-Chi-square	.270
Female	126 (50.4%)	20 (60.6%)		
Total	250 (100%)	33 (100%)		
3. Level of education				
Secondary & below	97 (38.8%)	11 (33.3%)	Chi-square	.116
Diploma	101 (40.4%)	19 (57.6%)		
Bachelor & masters	52 (20.8%)	3 (9.1%)		
Total	250 (100%)	33 (100%)		
4. Job category				
Auxiliary	53 (21.2%)	2 (6.1%)	*Chi-square	.005
Technicians	65 (26.0%)	15 (45.5%)		
Nurse	96 (38.4%)	16 (48.5%)		
Doctor	36 (14.4%)	0		
Total	250 (100%)	33 (100%)		
5. Infectious waste management training				
No	201 (80.4%)	28 (84.8%)	Chi-square	.541
Yes	49 (19.6%)	5 (15.2%)		
Total	250 (100%)	33 (100%)		
6. Duration of service	Mean=107.33 SD= 77.32	Mean=108.18 SD= 89.70	T-test	.953

* Only 1 cell has expected count less than 5. The minimum expected count is almost 5.

All 283 respondents in this research have not answered the questionnaire completely. Only 250 (88.3%) subjects have no missing data while 33 (11.7%) subjects have missing data. Those with missing data and no missing data were compared against age, gender, level of education, job category, infectious waste management training and duration of service. Table 4.13 shows that there is no significant difference between the missing and no missing subjects except in job category were there is significant difference (P= .005). In order to include the subjects with missing data in statistical analysis the mean of attitude or behavior scores need to be filled for the those with missing data. This may not give the true picture of the information from the subjects. Therefore further statistical analysis will be carried out only on 250 (88.3%) subjects with complete data.

4.3 Relationship between knowledge, attitude and socio-demographic factors, and behavior of health workers in infectious waste management.

4.3.1 Association between knowledge, attitude and behavior level in infectious waste management among the health care workers.

Table 4.15 : Association between the knowledge level, attitude level and behavior level of the health care workers in infectious waste management (n=250).

	Knowledge level		Chi-sq	df	p-value
	Low	High			
Behavior level			1.278	1	.258
Bad	21 (31.8%)	73 (39.7%)			
Good	45 (68.2%)	111 (60.3%)			
Total	66 (100%)	184 (100%)			
	Attitude level		Chi-sq	df	p-value
	Low	High			
Behavior level			31.209	1	.000
Bad	61 (57.5%)	33 (22.9%)			
Good	45 (42.5%)	111 (77.1%)			
Total	106 (100%)	144 (100%)			
	Knowledge level		Chi-sq	df	p-value
	Low	High			
Attitude level			3.051	1	.081
Low	34 (51.5%)	72 (39.1%)			
High	32 (48.5%)	112 (60.9%)			
Total	66 (100%)	184 (100%)			

As shown in table 4.14, Subjects with low knowledge had 68.2% and high knowledge had 60.3% good behavior levels with statistically no significant difference (P=.258).

Subjects with low attitude had 42.5% and high attitude had 77.1% good behavior levels with statistically significant difference (P<.001). Subjects with low

knowledge had 48.5 % and high knowledge had 60.9% good behavior levels with statistically no significant difference (P=.081).

4.3.2 Association between socio-demographic factors and behavior of health workers in infectious waste management.

Table 4.16 : Association between socio-demographic factors and behavior level in infectious waste management (n=250).

Socio-demographic factors	Behavior level		n	Chi-sq	df	P-value
	Good	Bad				
1. Age 20-30 years	70 (64.8%)	38 (35.2%)	108			
31-40 years	67 (58.8%)	47 (41.2%)	114	2.15	3	.700
41-50 years	16 ((69.6%)	7 (30.4%)	23	7		
≥51 years	3 (60.0%)	2 (40.0%)	5			
2. Gender						
Male	83 (66.9%)	41 (33.1%)	124	2.15	1	.142
Female	73 (57.9%)	53 (42.1%)	126	7		
3. Level of education						
≤Secondary	54 (55.7%)	43 (44.3%)	97			
Diploma	63 (62.4%)	38 (37.6%)	101	5.39	2	.068
Bachelor & masters	39 (75.0%)	13 (25.0%)	52	1		
4. Job category						
Auxiliary	36 (67.9%)	17 (32.1%)	53			
Technicians	35 (53.8%)	30 (46.2%)	65	5.31	3	.150
Nurses	58 (60.4%)	38 (39.6%)	96	3		
Doctors	27 (75.0%)	9 (25.0%)	36			
5. Infectious waste training						
No	131 (65.2%)	70 (34.8%)	201	3.36	1	.067
Yes	25 (51.0%)	24 (49.0%)	49	4		
6. Duration of service						
<1 year	8 (57.1%)	6 (42.9%)	14			
1-5.9 years	48 (64.9%)	26 (35.1%)	74	.959	3	.811
6-10.5 years	48 (64.9%)	26 (35.1%)	74			
≥11 years	52 (59.1%)	36 (40.9%)	88			

Socio- demographic factors had no significant affect on the behavior levels of health workers in infectious waste management as shown in table 4.16 however age group 41-50 years had 69.6% and 20-30 years had 64.8% good behavior levels. 66.9% males and 57.9% females had good behavior levels. In the education, bachelor and masters had 75%, diploma had 62.4%, and secondary and below had 55.7% good behavior level. Among the job category doctors had 75.0%, auxiliary had 67.9%, nurses had 60.4%, and technicians had 53.8% good behavior level. Of those who received no training 65.2% and who received training 51.0% had good behavior level. Health workers who had been in service from 1-5.9 years and 6-10.9 years had the highest percent (64.9%) of good behavior. Subjects who had been in service for less than 1 year had the least percent (57.1%) with good behavior.

4.4 Comparison of behavior of health professional and auxiliary staff in infectious waste management.

Table 4.17 : Comparative mean behavior of professional and auxiliary health workers in each of the 10 statements.

Statement	Auxiliary (n=53)	Professional (n=197)	Z	P-value
1. Wear gloves before handling waste	4.91	4.70	-2.365	.018
2. Do not forget to use protective measures in emergency situations	3.74	3.12	-3.558	.000
3. Do not recap needles after use	1.83	2.33	-2.230	.026
4. Washes hand after handling infectious waste	4.94	4.91	- .954	.340
5. Closes infectious waste bags when 3/4th full	4.91	4.62	-2.645	.008
6. Do not drag infectious waste during transport	4.79	4.76	-1.236	.217
7.Walk carefully on the route meant for infectious waste	4.96	4.36	-4.852	.000
8. Checks infectious waste bags for tear or puncture before transport	5.00	4.80	-2.725	.006
9. After spill of infectious waste, pickup, disinfect and clean the area	4.64	4.58	- .834	.404
10. Report accidental injuries sustained while handling waste	4.79	4.27	-3.859	.000
Total	44.51	40.12		

Non-parametric test, the 2 independent samples-Mann Whiteney test was used to analyze the behavior of professional and auxiliary staff in the 10 behavior statements. On behavior questions 4, 6 and 9, the was no statistically significant difference in

behavior of the two. In question 3, do not recap needles after use, the behavior of professionals were better than auxiliary with significant difference (P=.026). In rest of the questions, the behavior of auxiliary was better than the professionals with significant difference.

Table 4.18 :   Comparison between professionals and auxiliary staff in knowledge, attitude and behavior on infectious waste management.

Levels		Professionals (n=197)	Auxiliary (n=53)	Chi-sq	df	P-value
Knowledge level						
	High	171 (86.8%)	13 (24.5%)	83.355	1	.000
	Low	26 (13.2%)	40 (75.5%)			
Attitude level						
	High	127 (64.5%)	17 (32.1%)	17.942	1	.000
	Low	70 (35.5%)	36 (67.9%)			
Behavior level						
	Good	120 (60.9%)	36 (67.9%)	.875	1	.350
	Bad	77 (39.1%)	17 (32.1%)			

Table 4.18 shows that knowledge level of the professionals is higher than that of the auxiliary staff with statistically significant difference (p<.001). The attitude level is also higher in the professionals than in the auxiliary with significant difference (p<.001). The behavior level is slightly better among the auxiliary staff than in the professionals but stat there is no statistically significant difference (p=.350).

4.5 Elaborate on information for policy, deployment of policy and recommendations of health workers.

4.5.1 Perception of health workers towards policy and deployment of policy on infectious waste management.

Table 4.19 : Frequency and percentage of response to perception on policy and deployment of policy (n=283)

Statement	Least Import 1	Less Import 2	Neutral 3	Import 4	Very Import 5	Mean & rank
Content of policy						
- How important is legislation on waste management to you?	5 (1.8%)		9 (3.2%)	126 (44.5%)	142 (50.2%)	4.42 (3)
- How important is infectious waste management policy to you?	4 (1.4%)	4 (1.4%)	4 (1.4%)	112 (39.6%)	159 (56.2%)	4.48 (2)
- How important is manual on infectious waste management to you?		1 (0.4%)	9 (3.2%)	102 (36.0%)	171 (60.4%)	4.57 (1)
- How important is waste management team for the hospital?		5 (1.8%)	11 (3.9%)	129 (45.6%)	136 (48.1%)	4.41 (4)
Implementation of policy						
- How important is clearly defined procedures for management of wastes?	2 (0.7%)	1 (0.4%)	15 (5.3%)	134 (47.3%)	131 (46.3%)	4.38 (3)
- How important it is to include waste management responsibilities in your job description?	1 (0.4%)	3 (1.1%)	11 (3.9%)	139 (49.1%)	126 (44.5%)	4.38 (3)
- How important is waste management training for you?		3 (1.1%)	8 (2.8%)	41 (14.5%)	231 (81.6%)	4.77 (2)
- How important is personal protective equipment for proper management of infectious waste?		1 (0.4%)	3 (1.1%)	42 (14.8%)	237 (83.7%)	4.82 (1)
- How important are red bags for infectious waste, and Yellow box for sharps, for proper management of infectious wastes?	2 (0.7%)	1 (0.4%)	5 (1.8%)	29 (10.2%)	246 (86.9%)	4.82 (1)

Table 4.19 shows that the perception means score of health care workers on the policy and deployment of policy scale was almost same for all the nine questions and the mean score ranged between 4.38-4.82.

On policy content, infectious waste management manual has been ranked first followed by policy, legislation and waste management team as second, third and forth respectively.

On implementation of policy, personal protective equipment and waste management facilities were ranked first, while training was ranked second, and procedure and job responsibilities in infectious waste management were ranked third.

Table 4.20 : Comparative mean and rank of policy on infectious waste management by 4 categories of health workers.

Policy content	Auxiliary	Technician	Nurse	Doctor	Rank*
2. Infectious waste management policy	4.00 (3)	4.54 (3)	4.53 (2)	4.75	1
3. Manual on infectious waste	4.34 (2)	4.63 (1)	4.60 (1)	4.69	2
4. Waste management team	4.36 (1)	4.35 (4)	4.36 (4)	4.67	3
1. Legislation on hospital waste	3.87 (4)	4.62 (2)	4.46 (3)	4.58	4

*Ranking by doctors

Manual on infectious waste has been ranked 1 or 2 by all health workers. On rest of the items there is no general consensus on ranking.

Table 4.21 : **Comparative mean and rank of deployment of policy in infectious waste management by 4 categories of health workers.**

Deployment of policy	Auxiliary	Technician	Nurse	Doctor	Rank*
4. Availability of personal protective equipment	4.94 (1)	4.78 (2)	4.75(2)	4.89	1
5. Availability of red plastic bags &r yellow box	4.92 (2)	4.83 (1)	4.77(1)	4.75	2
1. Procedures for handling infectious waste	4.11 (4)	4.45 (4)	4.33(4)	4.64	3
3. Waste management training	4.89 (3)	4.77 (3)	4.75(2)	4.56	4
2. Waste management job responsibilities	4.11 (4)	4.32 (5)	4.40(3)	4.53	5

*Ranking by doctors

Availability of PPE and red plastic bags and yellow box has been ranked 1 and 2 by all health workers. Procedure for handling waste has been ranked 4th by all except the doctors.

4.5.2 Recommendations from the health workers for proper management of infectious waste.

Table 4.22 : **Number and percentage of health workers on recommendations made (n=283).**

Recommendations	Number	Percentage
1.No comments made	27	9.54%
2. One comment made.	64	22.61%
3. Two recommendations made	192	67.84%
Total	283	100.00%

Out of 283 subjects, no comments were made by 27 (9.54%), one comment made were 64 (22.61%) subjects and two comments were made by 192 (67.84%) subjects. A total of 21 different recommendations have been made by the health care workers. The major ones are training of health workers (35.70%), to make equipment available (11.48%), to supply adequate personal protective equipment (8.13%), CME for health workers (5.48%), infectious waste management manual be provided (2.65%), proper practice of infectious waste management (2.65%) and to form infectious waste management committee (2.47%).

The recommendations can be grouped under the following headings.

1. Policy

   - Hospital must have infectious waste management policy and plan.

   - Adequate budget to be obtained for infectious waste management.

   - IEC to public about infectious waste.

   - Infectious waste management to be included in the training curriculum.

   - Waste management committee to be formed.

   - Waste management responsibilities to be included in the job description.

2. Implementation of infectious waste management plan

   - Train all health workers in infectious waste management.

   - Continuing medical education for health workers.

   - Conduct periodic meeting for waste management.

   - Infectious waste manual be provided.

   - Effective waste treatment facility be available.

   - Safe storage site for infectious waste to be identified.

- Proper and safe waste disposal site to be identified.

- Make equipment available all the time.

- Supply adequate personal protective equipment.

- Make sure that everyone practice infectious waste management.

- Supervision is necessary at all levels.

- Enough manpower to be provided.

- Provide separate room for changing clothes.

3. Research and development

- Conduct operational research